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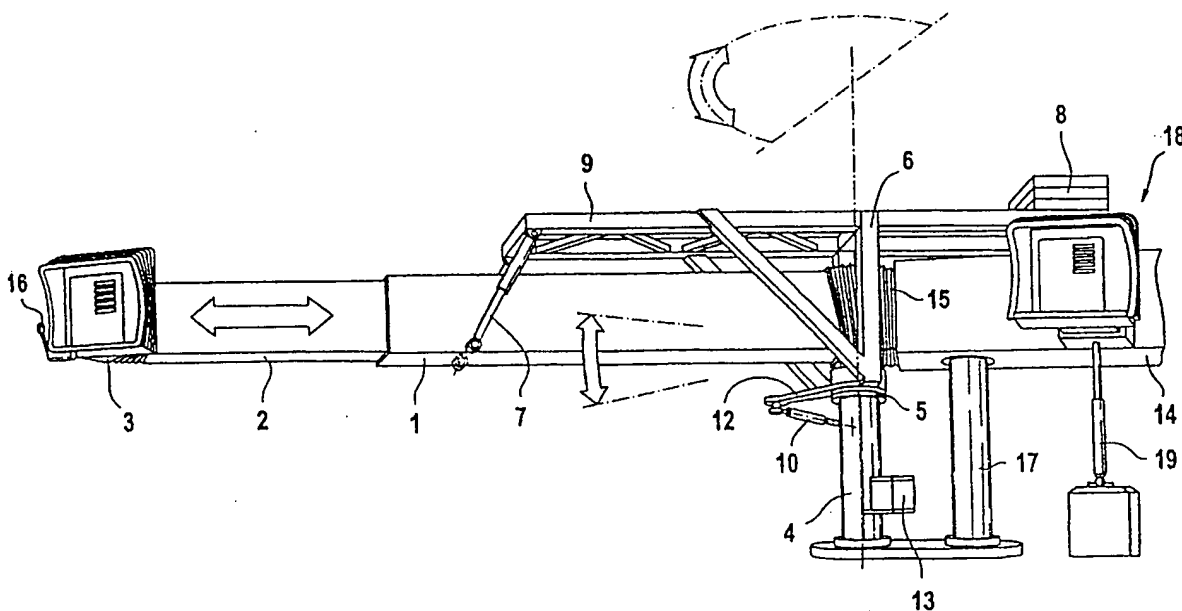
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(54) Titre : PASSERELLE POUR LES PASSAGERS D'UN AVION  
(54) Title: TELESCOPIC GANGWAY



(57) Abrégé/Abstract:

The invention relates to a telescopic gangway for boarding passengers onto a passenger aircraft that is parked in a nose-in position. Passengers go through the lateral rear door, a door which is located directly in front of or behind the wing and through a central door of the upper deck of a doubledeck aircraft. The telescopic gangway comprises a) telescopic tunnel sections (1, 2) that can be swivelled over the wing of the aircraft and that comprise a cabin (3) which can be moved towards the door of the aircraft, b) a frame (6) that surrounds the tunnel sections (1, 2), c) an extension arm (9) that is fixedly or moveably mounted on the aircraft, whereby the tunnel sections (1, 2) are hung on said extension arm (9) and d) a post (4) that is arranged in front of the wing pertaining to the aircraft, whereby the frame (6) is pivotally mounted on said post (4) around a vertical rotational axis and is rotationable up to an angle of 180°. The rotational axis is arranged centric in relation to the bridge tunnel (1).

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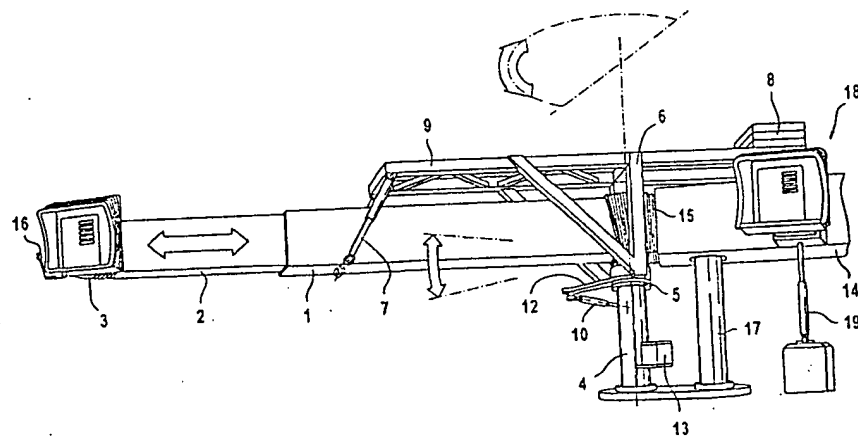
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(54) Title: **TELESCOPIC GANGWAY**

(54) Bezeichnung: **FLUGGASTBRÜCKE**

(57) Abstract

The invention relates to a telescopic gangway for boarding passengers onto a passenger aircraft that is parked in a nose-in position. Passengers go through the lateral rear door, a door which is located directly in front of or behind the wing and through a central door of the upper deck of a doubledeck aircraft. The telescopic gangway comprises a) telescopic tunnel sections (1, 2) that can be swivelled over the wing of the aircraft and that comprise a cabin (3) which can be moved towards the door of the aircraft, b) a frame (6) that surrounds the tunnel sections (1, 2), c) an extension arm (9) that is fixedly or moveably mounted on the frame (6), whereby the tunnel sections (1, 2) are hung on said extension arm (9) and d) a post (4) that is arranged in front of the wing pertaining to the aircraft, whereby the frame (6) is pivotably mounted on said post (4) around a vertical rotational axis and is rotationable up to an angle of 180°. The rotational axis is arranged centric in relation to the bridge tunnel (1).



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## Claims

## REPLACEMENT PATENT CLAIM

1. Telescopic gangway for handling the passengers of single-deck or double-deck  
5 passenger airplanes parked nose in at least at one of the doors of the main deck or upper  
deck, which doors are located in front of, above or behind the wing,
- a) with said tunnel elements (1, 2) which are pivotable over the wing of the  
airplane and can be telescoped with a said cabin (3) that can be moved up to  
the door of the airplane,
  - 10 b) with a said frame (6) surrounding the said, non-displaceable tunnel element  
(1),
  - c) with a said extension arm (9), which is rigidly or movably fastened to the said  
frame (6), on which the said telescoping tunnel elements (1, 2) are suspended  
in a height-adjustable manner in the case of a said, rigidly fastened extension  
15 arm (9) or are suspended in a height-adjustable manner together with the said  
extension arm (9) in the case of a said movable extension arm (9), and
  - d) with a said leg (4), which is arranged at a sufficient safe distance from the  
wing and the engine of the parked airplane and on which the said frame (6) is  
mounted pivotably by an angle of 180° around a vertical axis of rotation  
20 arranged centrally on the longitudinal axis of the said tunnel elements (1, 2).

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2. Telescopic gangway in accordance with claim 1, **characterized in that** the said frame (6) is mounted on the said leg (4) with a said ball type rim bearing (5).
3. Telescopic gangway in accordance with claim 1 or 2, **characterized in that** said respective projecting bearing brackets (11, 12), between which said lifting cylinders (10) acting in both directions or other pivoting drives usually used in tower slewing cranes are fastened, are fastened to the said leg (4) and to the said frame (6) for pivoting the telescopic gangway around the said leg (4).
4. Telescopic gangway in accordance with claim 1, 2 or 3, **characterized in that** one or more said lifting cylinders (7) or mechanical spindle drives are fastened in an articulated manner either to the said gangway tunnel (1) and to the airplane-side end of the said rigid extension arm (9) or to the top end of the said frame (6) as well as to the terminal-side top end of the movable extension arm (9) for adjusting the height of the airplane-side end of the telescopic gangway.
5. Telescopic gangway in accordance with one of the claims 1 through 4, **characterized in that** a said counterweight (8) is arranged on the side of the said extension arm (9) connected to the said frame (6), which said side faces away from the said cabin (3).
6. Telescopic gangway in accordance with one of the claims 1 through 5, **characterized in that** the said extension arm (9) [can be pivoted? - Tr.Ed.] by up to 180° around a vertical axis of rotation and the said gangway tunnel (1) can be raised and lowered by up to 45° in relation to the approximately horizontal apron around a horizontal axis of rotation arranged in the area of the said frame (6).
7. Telescopic gangway in accordance with one of the claims 1 through 6, **characterized in that** distance-measuring devices or sensors are arranged on the underside of the said gangway tunnel (1) pivotable over the wing of the airplane and/or of the said inner tunnel (2) and/or of the said cabin (3) in order to prevent a contact with the wing or to automatically raise the said gangway tunnel (1) correspondingly in case of an unacceptable approach.

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## TELESCOPIC GANGWAY

## Specification

The present invention pertains to a telescopic gangway according to the preamble of claim 1.

5 A stationary telescopic gangway for loading and unloading airplanes parked at right angles to the airport terminal with a gangway part extending over the wing approximately in parallel to the fuselage and a plurality stairs which are arranged thereon offset by 90° and are displaceable in the longitudinal direction of the gangway with cabins for lateral contact with the fuselage has been known from DE OS 20 57 464. The supporting structure of the gangway is suspended on stationary pylons via a complicated framework and the stairs are  
10 mounted at the free end in a height-adjustable manner and displaceably in the longitudinal direction of the supporting structure of the gangway. This gangway structure is very complicated and can be used for limited, uniform airplanes.

A so-called "over-the-wing" telescopic gangway has been known as well, in which the telescoping tunnel parts with the cabin arranged at the end are suspended in a height-  
15 adjustable manner and pivotably through a maximum of 30° in a rigid support structure anchored on the apron (see Aviobridge MK-11 "over-the-wing" bridge, Flughafen Amsterdam Schiphol + DE OS 19 63 983).

DE 197 17 386 A1 shows a multiple telescopic gangway for embarking and disembarking passengers of jumbo jets with a gangway extension arm and a ramp gangway, which are  
20 suspended vertically displaceably on a tower or frame. In one embodiment, the gangway extension arm is suspended in two vertically displaceable support frames, wherein an inner

frame is mounted on a support column rotatably around an eccentric vertical axis and an outer frame is displaceable via tangentially arranged floor rollers. However, the range of pivoting is limited to a maximum of 30° here due to the out-of-center arrangement of the vertical axis, so that the telescopic gangway has only a limited use.

- 5 The basic object of the present invention is to propose an especially variable telescopic gangway, by means of which it is possible to handle either narrow-body airplanes at the lateral tail door or wide-body and double-deck airplanes at the door arranged behind the wing or at one of the middle doors of the upper deck or wide-body airplanes also at the door arranged in front of the wing in combination with a telescopic gangway handling  
10 exclusively the nose door.

This object is accomplished as described in patent claim 1. Subclaims 2 through 7 contain meaningful embodiments herefor.

- Provisions are made according to the present invention for the part of the telescopic gangway which leads over or along the wing and comprises the extension arm and the  
15 telescoping tunnel with the cabin, which said tunnel is suspended on or is directly fastened to the extension arm, to be fastened to a frame, which surrounds the gangway tunnel and is pivotable around a central vertical axis of rotation on a leg firmly anchored on the apron in front of the wing. The gangway tunnel is rigidly connected to the frame in the horizontal pivoting direction. In addition, the cabin-side end of the telescopic gangway can be  
20 adjusted in height around a horizontal axis of rotation arranged in the area of the frame by means of lifting cylinders or other mechanical adjusting means fastened in an articulated manner either at the apron-side or terminal-side end of the extension arm.

Depending on the category of the airplanes to be handled, a short or long leg may be

provided to keep the adjustment of the cabin height as small as possible. The frame may be mounted according to the present invention on a ball type rim bearing on the leg. The frame can be pivoted by up to 180° by means of lifting cylinders acting in both directions or other adjusting means which act on bearing brackets. The gangway tunnel with the parts fastened thereto can be raised and lowered by up to 45° in relation to the approximately horizontal apron by means of the lifting cylinders arranged at the end of the extension arm.

The weight of the part of the telescopic gangway pointing toward the airplane is preferably balanced with a counterweight fastened to the extension arm. However, the counterweight with the part of the extension arm projecting toward it may be eliminated in the case of a correspondingly flexurally rigid embodiment of the leg, the ball type rim bearing and the frame.

It has proved to be favorable for safety reasons to provide a number of distance-measuring devices or sensors or contacts, which automatically raise the parts pivoting over the wing in the case of contact and an unacceptable approach, on the underside of the parts pivoting over the wing, especially of the gangway tunnel.

The gangway structure according to the present invention may also be used especially for handling passenger ships.

The present invention will be explained in greater detail as an example on the basis of Figures 1 through 4 attached. In the drawings,

Figure 1 shows a perspective view of the telescopic gangway with short leg, which is docked with a lateral tail door of a "narrow-body" airplane, complemented by a "nose loader" 18 docked with the nose door as well as with a fixed

connection web 14 connected to the airport terminal;

Figure 2 shows a perspective view of the telescopic gangway with long leg, which is docked with the door of the main deck, which door is located behind the wing or at one of the middle doors of the upper deck of a future double-deck airplane;

Figure 3 shows a perspective view of the telescopic gangway with a fixed connection web 14 joined to the telescopic gangway as a view from the apron in the direction of the airplane, not shown;

Figure 4 shows another perspective view of the telescopic gangway with a "nose loader" 18 joined to the fixed connection web as viewed from the apron;

Figure 5 shows a perspective view of a telescopic gangway docked optionally with the lateral tail door of a narrow-body airplane or with the door of a wide-body airplane, which door is located in front of the wing, without counterweight and a projecting extension arm;

Figure 6 shows a perspective view of the telescopic gangway shown in Figure 5 with joined fixed connection web 14 in a view from the apron in the direction of the airplane, not shown; and

Figure 7 shows another perspective view of the telescopic gangway shown in Figure 5 as viewed from the apron.

The figures show clearly only the components of the telescopic gangway that are relevant



for the present invention. The telescoping tunnels 1 and 2 leading over (Figures 1, 2 and 5) or along (Figure 5) the wing with the cabin 3 arranged movably at the airplane-side end of the tunnel are pivotable as a whole around the leg 4 anchored on the apron by means of a ball type rim bearing 5. An essentially rectangular or square frame 6 is pivotable by up to 180° around a vertical axis on the ball type rim bearing. The gangway tunnel 1, which is pivotable around an essentially horizontal axis of rotation approximately in the middle of the said frame, passes through the frame 6. The extension arm 9 is connected to the frame 6 either rigidly (Figures 1 through 4) or movably (Figures 5 through 7) by means of two lifting cylinders 7. The horizontal extension arm 9 is connected to the rear counterweight 8 at the top end of the frame 6 in the first case, and the extension arm 9, which is preferably designed as a cantilever beam, is connected at the bottom to the frame 6 in an articulated manner in the second case. In the embodiment shown as an example in Figures 1 through 4, the gangway tunnel 1 is suspended on the end of the extension arm 9 facing the cabin 3 in an articulated and height-adjustable manner by means of two lifting cylinders 7. In the exemplary embodiment without counterweight and a projecting extension arm, which is shown in Figures 5 through 7, the extension arm 9 projecting toward the cabin 3 is, in contrast, connected to the frame 6 in an articulated manner at the bottom and in a height-adjustable manner at the top by means of two lifting cylinders 7.

The entire telescopic gangway is preferably pivoted around the leg 4 by means of a lifting cylinder 10, which acts in both directions and is fastened in an articulated manner to projecting bearing brackets 11 and 12 on the leg 4 and on the frame 6. Instead of by means of the lifting cylinder 10, the telescopic gangway can also be pivoted by means an electric motor-driven pivoting drive, which engages the toothed ball type rim bearing 5 and is usually used, e.g., in tower slewing cranes. The hydraulic unit 13 for the pivoting and lifting cylinders 10 and 7 is located at the foot of the leg and in the leg 4, respectively.

The flexible connection between the gangway tunnel 1 and the fixed connection web 14 can be brought about by means of a bellows 15 or a rotunda with vertical rolling walls which is usually used in telescopic gangways. The underside of the gangway tunnel 1 leading over the wing is provided with a sufficient number of distance-measuring devices, sensors or contacts, which automatically move the gangway upward in case of contact or an unacceptable approach. After correct docking of the telescopic gangway with the door of the airplane, the contact wheel 16 performs the automatic height adjustment.

Figure 4 additionally shows a fixed support 17 for the connection web 14. A prior-art "nose loader" gangway 18 with a height adjusting means 19 is additionally located at this connection web 14 for handling the nose door. The directions of movement of the telescopic gangway are additionally indicated by double arrows in Figures 3 and 4.

Figure 5 shows a connection web 14 which is supported directly on a bracket support projecting from the leg 4. Furthermore, a prior-art telescopic gangway 18 is additionally shown for handling the nose door. The directions of movement of the telescopic gangways are additionally indicated by double arrows in Figures 3, 4, 6, and 7.

**List of Reference Numbers**

- |    |      |   |
|----|------|---|
|    | (1)  | Gangway tunnel  |
|    | (2)  | Inner tunnel, telescoping in (1)  |
|    | (3)  | Cabin at the end of (2)   |
| 5  | (4)  | Leg   |
|    | (5)  | Ball type rim bearing   |
|    | (6)  | Frame   |
|    | (7)  | Lifting cylinder between (1) and (9) in Figures 1 through 4 or between (6) and (9) in Figures 5 through 7                 |
| 10 | (8)  | Counterweight   |
|    | (9)  | Extension arm   |
|    | (10) | Lifting cylinder between (11) and (12)  |
|    | (11) | Bearing bracket on (4)  |
|    | (12) | Bearing bracket on (6)  |
| 15 | (13) | Hydraulic unit for (10) and (7)   |
|    | (14) | Fixed connection web between the airport terminal and (17) in Figures 1 through 4 or between the airport terminal and (4) |
|    | (15) | Bellows between (1) and (14)  |
|    | (16) | Contact wheel at (3)  |
| 20 | (17) | Fixed support of (14)   |
|    | (18) | Gangway for front door of airplane (nose loader or telescopic gangway)  |
|    | (19) | Height adjusting means for (18)   |

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Fig. 1

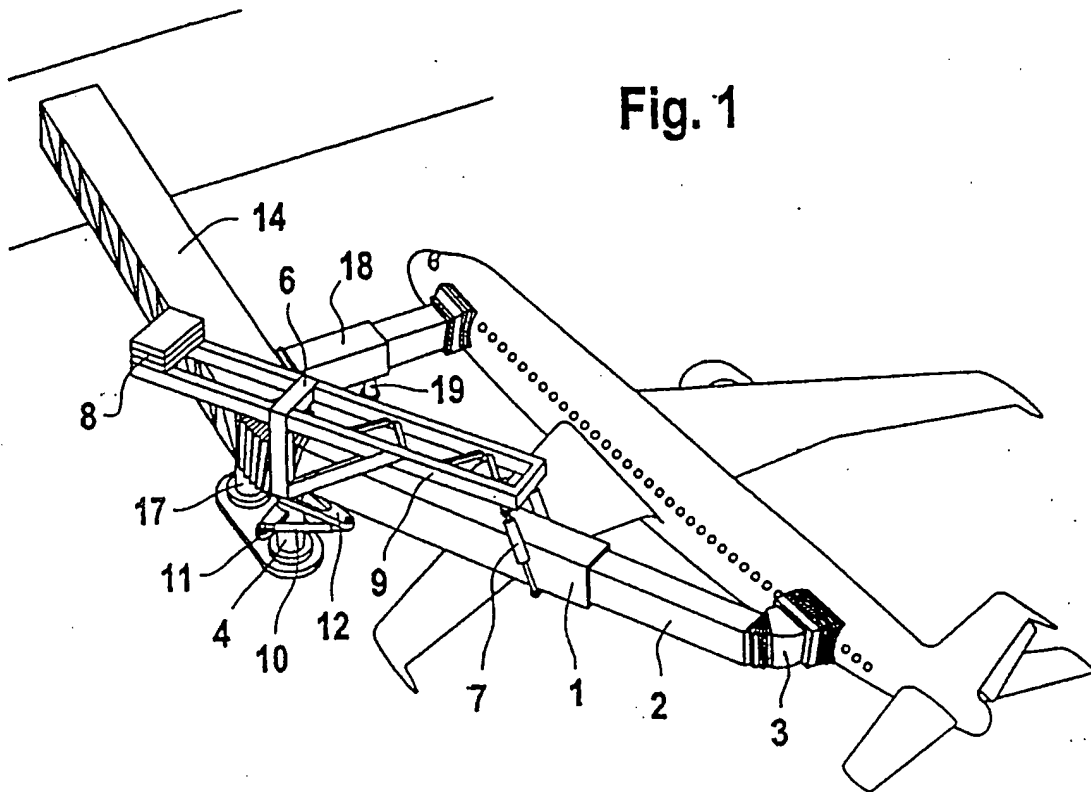
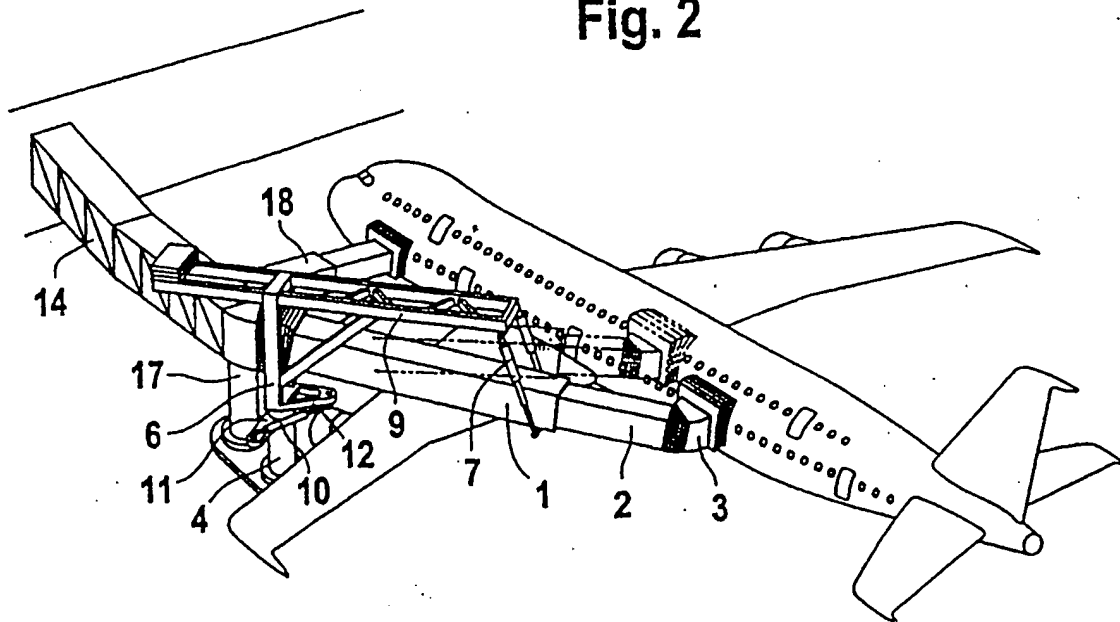


Fig. 2



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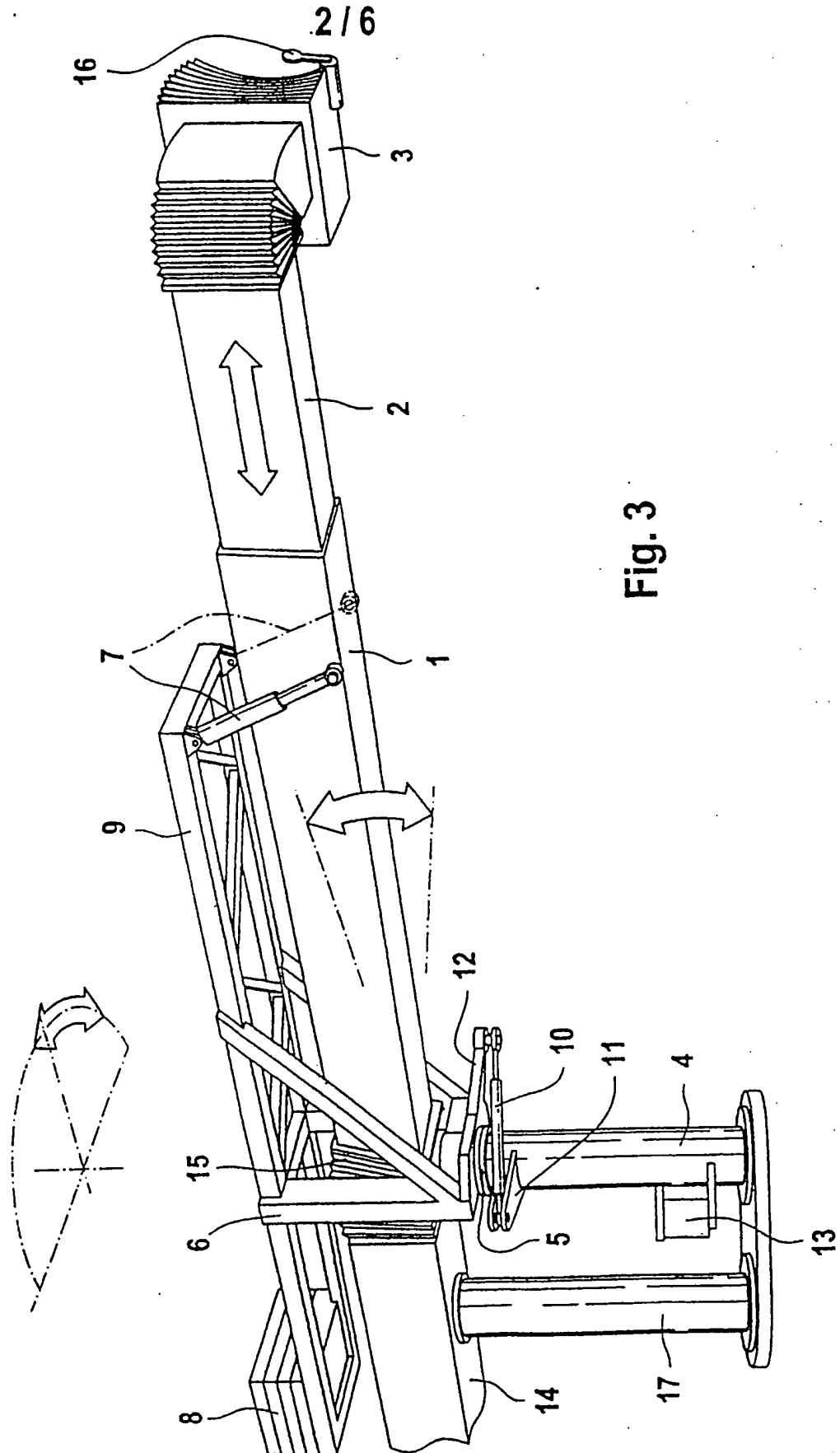
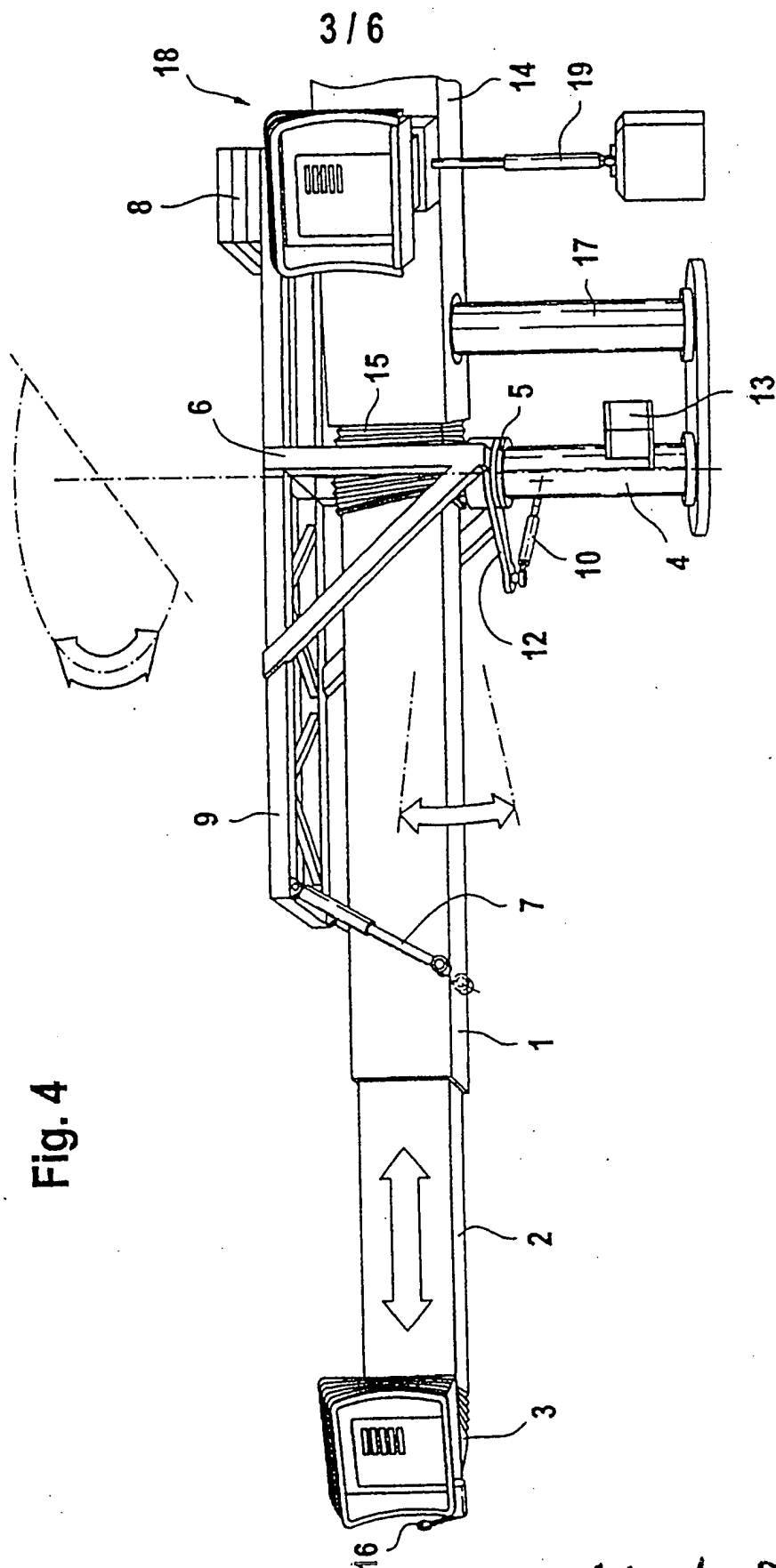


Fig. 3



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Fig. 5

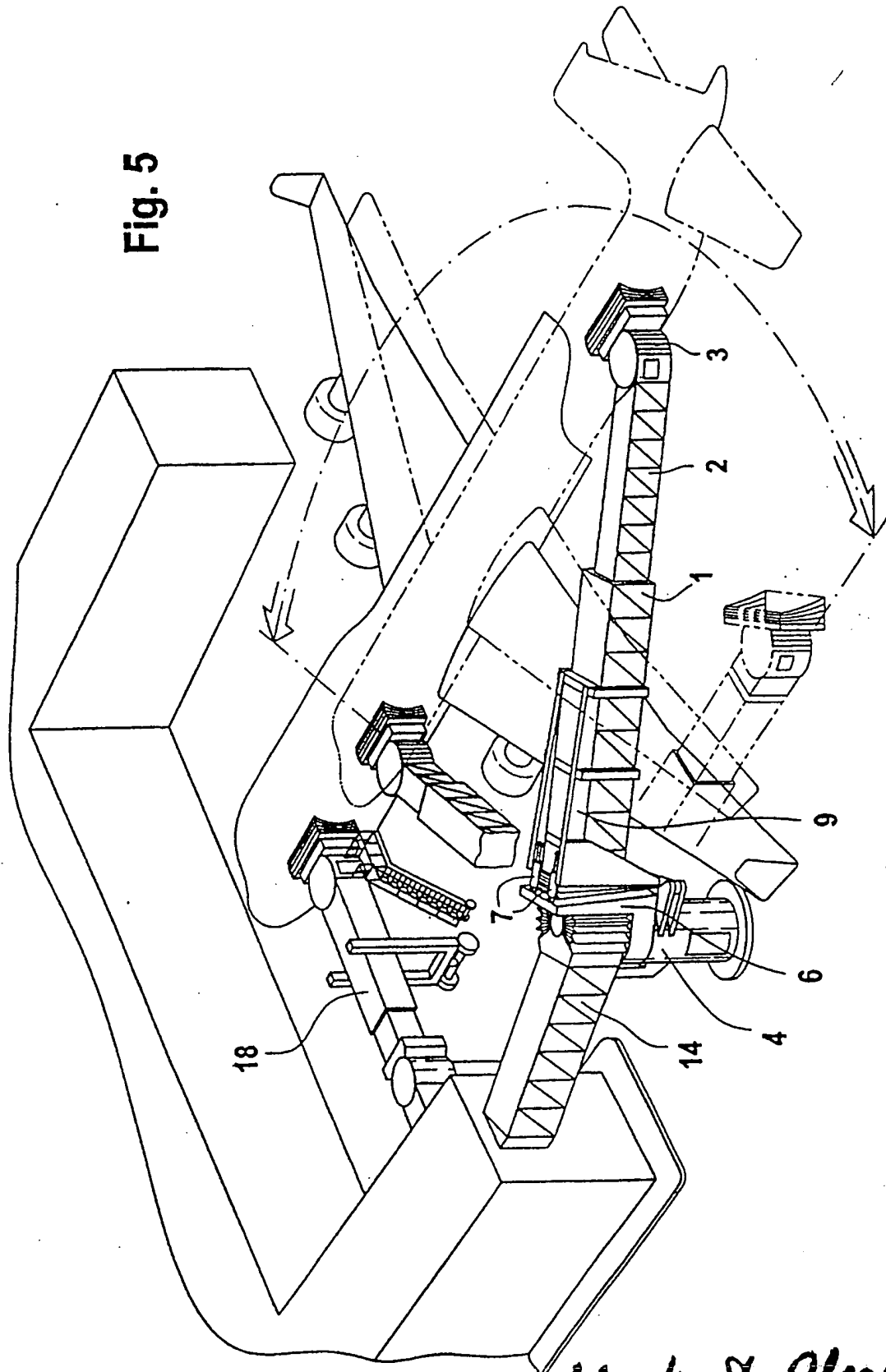
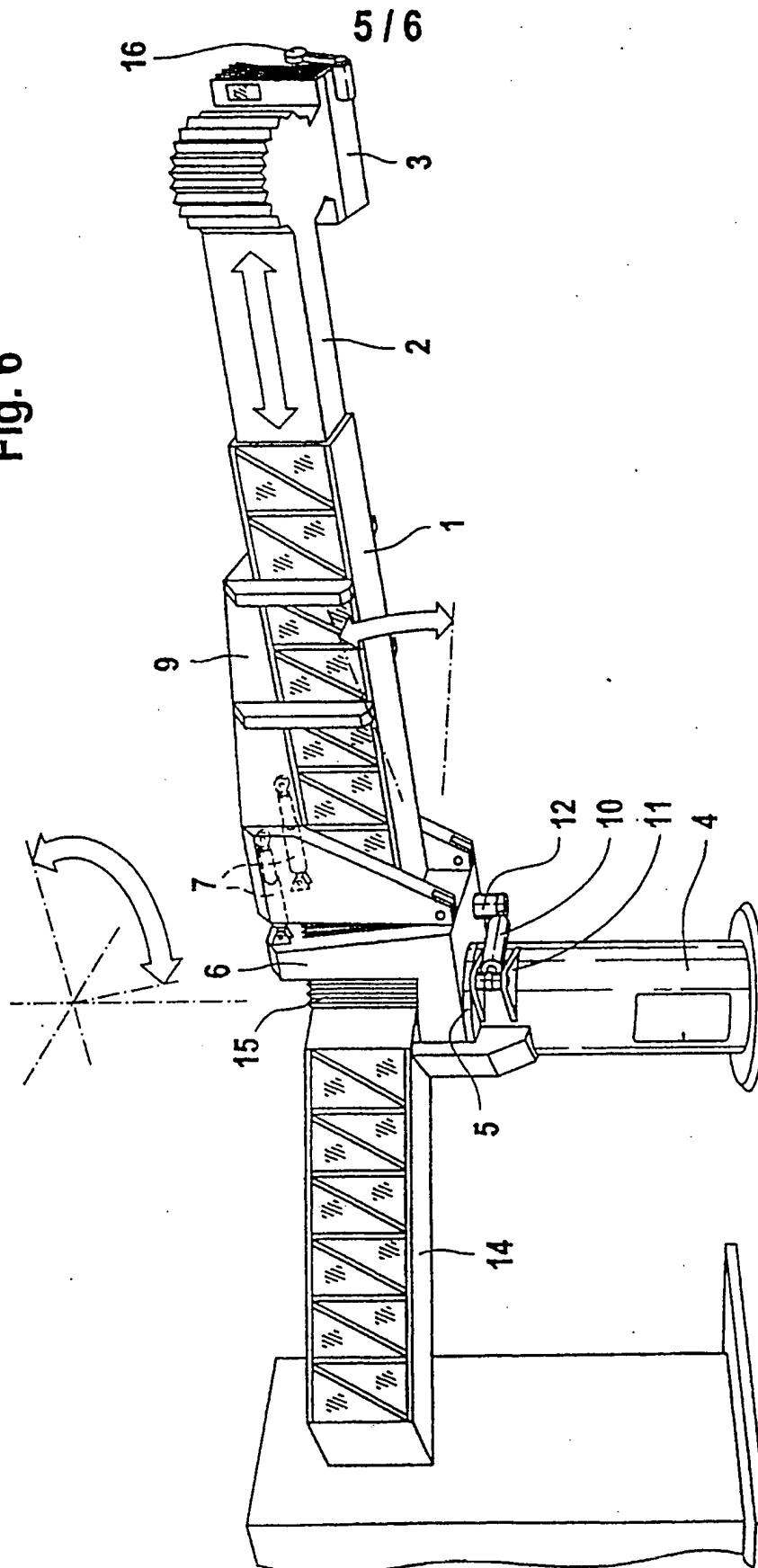


Fig. 6



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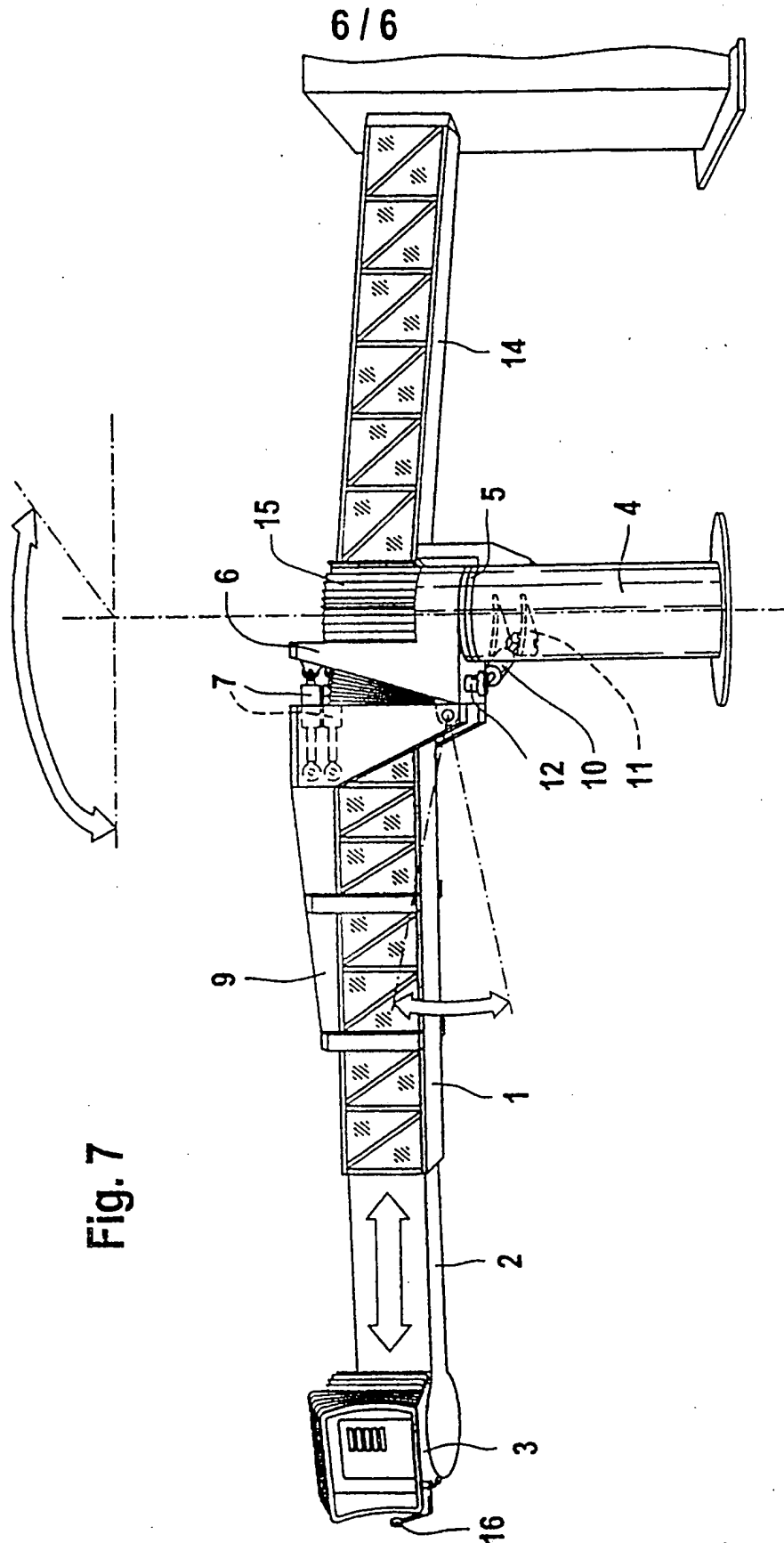


Fig. 7

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